

CLAIMS

What is claimed is:

1. A navigated orthopaedic guide for use with a surgical navigation system during an orthopaedic surgical procedure to establish a datum relative to a surgical site, the datum being able to be engaged by a subsequent surgical component to guide placement of the subsequent surgical component, the orthopaedic guide comprising:
 - means for being tracked by the surgical navigation system to position the orthopaedic guide at a desired position relative to the surgical site; and
 - means for establishing a datum at a desired position relative to the surgical site such that the datum is able to be engaged by a subsequent surgical component to guide placement of the subsequent surgical component.
2. The navigated orthopaedic guide of claim 1 wherein the means for establishing a datum comprises means for establishing one or more datums relative to the surgical site selected from the list consisting of pins, screws, bars, fins, rails, dovetails, planar surfaces, holes, slots, and/or notches.
3. The navigated orthopaedic guide of claim 1 wherein the means for establishing a datum comprises means for establishing an intermediate datum separate from the guide itself.
4. The navigated orthopaedic guide of claim 1 wherein the means for establishing a datum comprises a guide body including a plurality of holes through the body for guiding the placement of pins relative to the surgical site.
5. The navigated orthopaedic guide of claim 4 wherein the guide body comprises a body having a planar surface engageable with a distal cut surface of a femur and the plurality of holes includes a common hole and a plurality of size specific holes, each of the size specific

holes corresponding to a different size of subsequent surgical component such that placement of a pin through the common hole and one of the size specific holes results in a two pin datum engageable by a specific size of subsequent surgical component.

6. The navigated orthopaedic guide of claim 4 wherein the guide body comprises a body having a planar surface engageable with a distal cut surface of a femur and the plurality of holes includes a plurality of central holes and each central hole has associated with it a plurality of size specific holes, each of the size specific holes corresponding to a different size of subsequent surgical component such that placement of a pin through one of the central holes and one of the corresponding size specific holes results in a two pin datum engageable by a specific size of subsequent surgical component.

7. The navigated orthopaedic guide of claim 1 wherein the means for establishing a datum comprises a body having a planar reference surface for engaging a distal femoral surface of a femur during knee replacement surgery, the body having a width approximately one-half the medial-lateral width of the distal femoral surface, the body having at least one hole for guiding a pin into engagement with the approximate center of the distal femoral surface and at least one other hole for guiding a pin into engagement with the distal femoral surface to establish a datum comprising at least two pins engageable by a femoral finishing cut guide.

8. The navigated orthopaedic guide of claim 1 wherein the means for establishing a datum includes a base member and a datum guide member connected to the base member such that the position of the datum guide member is adjustable relative to the base member to a desired datum guide member position as indicated by the surgical navigation system.

9. The navigated orthopaedic guide of claim 8 wherein the base member is able to be secured to a distal portion of a femur and the datum guide member is adjustable relative to the base member to establish a datum having desired flexion-extension and varus-valgus angles as indicated by the surgical navigation system.
10. The navigated orthopaedic guide of claim 8 wherein the base member is able to be secured to a proximal portion of a tibia and the datum guide member is adjustable relative to the base member to establish a datum having desired posterior slope and varus-valgus angles as indicated by the surgical navigation system.
11. The navigated orthopaedic guide of claim 1 wherein the means for establishing a datum comprises a base member defining a first adjustment axis, a connecting link mounted for rotation about and translation along the first adjustment axis, the connecting link defining a second adjustment axis, and a guide member mounted for rotation about and translation perpendicular to the second guide axis.
12. The navigated orthopaedic guide of claim 11 further comprising locking means for locking the connecting link relative to the first adjustment axis and the guide member relative to the second adjustment axis.
13. The navigated orthopaedic guide of claim 11 wherein the first adjustment axis is defined by a cylindrical bore formed transversely through an adjustment member, the connecting link including a cylindrical shaft engageable with the cylindrical bore for rotation within and translation along the cylindrical bore, the adjustment member being able to be pulled transversely relative to the first adjustment axis to clamp the cylindrical shaft in a locked position.

14. The navigated orthopaedic guide of claim 13 wherein the connecting link includes a tab having a cylindrical bore defining the second adjustment axis, the guide member having a yoke surrounding the tab and a pivot extending through the bore of the tab and the yoke, the yoke being rotatable about the second adjustment axis and the yoke including an elongated slot permitting it to translate perpendicular to the axis, the yoke including a locking mechanism for compressing the yoke into engagement with the tab to lock the yoke in position relative to the tab.
15. A surgical system for use during an orthopaedic surgical procedure at a surgical site of a patient's body, the system comprising:
 - a surgical navigation system including means for tracking the position of an object during a surgical procedure;
 - a navigated orthopaedic guide including means for being tracked by the surgical navigation system to guide positioning of the orthopaedic guide at a desired position relative to the surgical site, the orthopaedic guide including means for establishing a datum at a desired position relative to the surgical site; and
 - a surgical component including means for engaging the datum positioned by the orthopaedic guide to locate the surgical component at a desired position relative to the surgical site.
16. The system of claim 15 wherein the means for tracking comprises multiple sensors to detect and triangulate the position of the orthopaedic guide.
17. The system of claim 15 wherein the means for being tracked comprises an electromagnetic coil attached to the orthopaedic guide, the electromagnetic coil producing a signal detectable by the means for tracking.

18. The system of claim 15 wherein the means for establishing a datum comprises a drill guide to guide a drill in forming a hole in a bone at the surgical site.
19. The system of claim 15 wherein the means for establishing a datum comprises at least one hole in the orthopaedic guide to guide placement of a pin adjacent the surgical site.
20. The system of claim 15 wherein the surgical component comprises an implant for replacing a portion of a bone.
21. The system of claim 15 wherein the surgical component comprises a cut guide to guide a cutter to cut a bone to receive an implant.
22. The system of claim 21 wherein the cut guide comprises a femoral finishing guide including guides for guiding a saw blade to shape the end of a femoral bone to receive a femoral knee implant.
23. The system of claim 21 wherein the cut guide comprises a distal femoral cut guide.
24. The system of claim 21 wherein the cut guide comprises a proximal tibial cut guide.
25. The system of claim 15 wherein the means for engaging the datum comprises at least one hole formed in the surgical component to receive the datum in the form of a pin.
26. The system of claim 15 wherein the means for establishing a datum directly engages the subsequent surgical component.
27. A method of performing an orthopaedic surgical procedure at a surgical site of a patient's body, the method comprising:
 - activating a surgical navigation system to track the position of an orthopaedic guide;
 - positioning the orthopaedic guide relative to the surgical site in a desired position as indicated by the surgical navigation system;
 - establishing a datum relative to the surgical site with the orthopaedic guide; and

engaging the datum with a surgical component to position the surgical component at a desired position relative to the surgical site.

28. The method of claim 27 wherein establishing a datum comprises forming at least one hole in a bone at the surgical site while using the orthopaedic guide as a drill guide.
29. The method of claim 27 wherein establishing a datum comprises positioning at least one pin in a bone at the surgical site.
30. The method of claim 29 wherein the orthopaedic guide includes a plurality of holes for placing pins in a bone at the surgical site and wherein establishing a datum comprises:
 - positioning a first hole in the orthopaedic guide at a desired location as indicated by the surgical navigation system;
 - inserting a first pin through the first hole and into the bone;
 - pivoting the orthopaedic guide about the first pin until a second hole is positioned at a desired location as indicated by the surgical navigation system; and
 - inserting a second pin through the second hole and into the bone.
31. The method of claim 29 wherein engaging the datum with a surgical component comprises engaging an opening in the surgical component with the at least one pin.
32. The method of claim 31 wherein the surgical component comprises a cut guide for guiding a cutter to cut a bone to receive an implant, the method comprising:
 - guiding a cutter with the cut guide to shape the bone to receive an orthopaedic implant.
33. The method of claim 27 wherein positioning the orthopaedic guide comprises positioning the orthopaedic guide adjacent the distal portion of the femur near the knee joint and engaging the datum comprises engaging the datum with a femoral cut guide.

34. The method of claim 27 wherein positioning the orthopaedic guide comprises positioning the orthopaedic guide adjacent the proximal portion of the tibia near the knee joint and engaging the datum comprises engaging the datum with a tibial cut guide.
35. The method of claim 27 further comprising:
 - providing an orthopaedic guide having a base member and a datum guide member adjustable relative to the base member;
 - securing the base member relative to a bone adjacent the surgical site; and
 - adjusting the datum guide member relative to the base member to a desired datum guide member position as indicated by the surgical navigation system.
36. The method of claim 35 wherein the datum guide member is angularly adjustable in two planes relative to the base member, securing the base member comprises securing it adjacent the distal femur near a knee joint, and adjusting the datum guide member comprises adjusting the datum guide member to a desired flexion and varus-valgus orientation.
37. The method of claim 35 wherein the datum guide member is angularly adjustable in two planes relative to the base member, securing the base member comprises securing it adjacent the proximal tibia near a knee joint, and adjusting the datum guide member comprises adjusting the datum guide member to a desired posterior slope and varus-valgus orientation.
38. A method of performing orthopaedic surgery at a surgical site of a patient under the control of a surgical navigation system, comprising:
 - providing conventional non-navigated surgical instruments;
 - providing a navigated orthopaedic guide;

guiding the navigated orthopaedic guide with the surgical navigation system to a desired location relative to the surgical site;
establishing a datum relative to a bone at the surgical site;
engaging the conventional non-navigated instruments with the datum; and
completing the surgery using the conventional non-navigated instruments.

39. The method of claim 38 wherein the step of establishing a datum comprises inserting a pin into the bone to establish a datum and the step of engaging comprises engaging the pin.
40. The method of claim 39 wherein the conventional non-navigated surgical instruments comprise a femoral finishing guide having at least one cutter guide for guiding a cutter to shape the end of a femoral bone to receive a femoral knee implant and the step of completing the surgery comprises guiding a cutter to cut the end of a femoral bone.
41. The method of claim 39 wherein the conventional non-navigated surgical instruments comprise a tibial cut guide having at least one cutter guide for guiding a cutter to shape the end of a tibial bone to receive a tibial knee implant and the step of completing the surgery comprises guiding a cutter to cut the end of a tibial bone.